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## Aircraft navigation sharpened

By Alan Buis

*JPL's Ron Muellerschoen, right, demonstrated a factor of 10 improvement over current autonomous navigation systems.*

JPL researchers have demonstrated the ability to very precisely navigate airplanes in real time, anywhere in the world, independent of local navigational aids or infrastructure. The breakthrough will not only benefit scientists, but promises to extend precision navigation to infrastructure-poor areas of the world, potentially enhancing aviation safety in these areas.

Ron Muellerschoen, lead architect of the NASA Global Differential Global Positioning System (GPS) at JPL, has demonstrated the ability of the system to achieve real-time aircraft positioning accuracy of 10 centimeters (3.9 inches) horizontally and 20 centimeters (7.9 inches) vertically, anywhere in the world—a factor of 10 improvement over current autonomous navigation systems. The system relays precise, real-time navigation data to specially equipped aircraft. The JPL team's results were presented recently at the Institute of Navigation System GPS 2002 Exhibit in Portland, Ore.

Although developed to improve the accuracy, efficiency and timeliness of Earth science missions, the technology's by-products may also include numerous civil and commercial applications in such areas as aviation safety, marine operations, land management, transportation and agriculture, said Dr. Yoaz Bar-Sever, the principal investigator for NASA's Global Differential GPS system at JPL. "Civil and commercial navigation services, currently only available within Earth's infrastructure-rich regions, could now be extended to any part of the world without lowering performance and with little to no marginal cost," he said.

Within the field of Earth science, Bar-Sever said, the technology would be used to develop better exploration techniques for Earth-observing instruments flying aboard aircraft and spacecraft. "The ability of Earth science instruments to precisely and autonomously know their position and velocity in real time is critical to many Earth-observing applications, including monitoring and responding to natural hazards such as earthquakes, volcanoes and hurricanes," he said.

JPL's Airborne Synthetic Aperture Radar Group has already used the precise real positioning from the Global Differential GPS system to improve the resolution of Earth images from NASA's aircraft-based Airborne Synthetic Aperture Radar instrument, said Group Supervisor David Imel, who envisions even greater use for the system in the near future. "For missions where an aircraft must fly exactly the same flight profile repeatedly, in order to sense subtle changes in the Earth from one flight to the next, the need for the extremely precise navigational accuracy that this system provides is critical," he said.

In space, precise onboard knowledge of position will improve the efficiency of a spacecraft's onboard data processing and reduce the time needed to transmit data to the ground. Bar-Sever and his team have already conducted successful demonstrations of decimeter-level real-time satellite positioning using data from NASA's Jason-1 spacecraft and the Argentinean Satelite de Aplicaciones Cientificas-C satellite. The team is currently developing a prototype payload to be flown aboard a spacecraft.

The NASA Global Differential GPS system flight demonstrations were conducted over the United States and Greenland in February through September



ber 2002 aboard a NASA Airborne Synthetic Aperture Radar DC-8 aircraft from NASA's Dryden Flight Research Center, Edwards, Calif., and a NASA P-3 aircraft from NASA's Wallops Flight Facility in Virginia.

Developed and operated by JPL since 1999 for NASA's terrestrial, airborne, and spaceborne science applications, NASA's Global Differential GPS system provides end-to-end capabilities for autonomous, real-time orbit determination and positioning at unprecedented levels of accuracy and availability. The system processes real-time GPS data from a global network of more than 30 dual-frequency GPS ground sites. It is the only system in existence that provides global, multiply redundant, real-time coverage of all GPS satellites, all the time. It routinely and automatically produces the most accurate real-time estimates of GPS satellite orbits and clocks, media calibrations and many other products and performance metrics. The system leverages NASA investments in the global GPS network and the U.S. government's investment in the Wide Area Augmentation System navigation technology developed at JPL.

More information about the Internet-based Global Differential GPS system is available online at <http://gipsy.jpl.nasa.gov/igdg>.

Photo by Richard Hasegawa / JPL Photolab

## Changes noted for JPL award programs

JPL's Executive Council has approved several changes to the Laboratory's award programs. One of the most significant changes is a dramatic increase in the number of Team Member Bonus Awards. This award provides an opportunity to give monetary awards to team members. The number of team member awards will increase from 300 in fiscal year 2002 to about 1,000 in FY '03.

Additionally, the number of Spot Awards available to recognize individuals on an impromptu basis for special effort or high quality product or service will increase in numbers for FY '03. Last fiscal year, JPL allocated about 900 American Express Gift

Cheques valued at \$100 each; this fiscal year the number will increase to about 1,200.

The increase to both the Bonus and Spot Awards were made because of management's use of the programs as well as requests for additional awards at the local level and for teams.

Redirecting resources from the Award for Excellence Program, which has been discontinued, made these changes possible. Peer nominations, which are seen as valuable by the Lab population, will be continued through encouragement by management.

Another significant change involves the JPL Service Award Program. Recipients of the 10-, 15-, and 20-year service awards will now have their awards presented to them in a local setting by their management. This change was made to allow recipients a more meaningful and intimate setting to receive their awards. Recipients for 25 or more years (in five-year increments) will continue to be invited, along with their guests, to a luncheon hosted by JPL's executive management.

Please visit the Employee Services and Recognition website at <http://hr/esr> for more detailed information on these changes or on any other award program.

EMPLOYEE SERVICES & RECOGNITION



# News Briefs



Thomas May

### May receives minority honor

THOMAS MAY, manager of the JPL Business Opportunities Office (Section 264), received the 2002 outstanding Procurement Advocate award at the recent Minority Enterprise Development Week Awards.

The event is sponsored by the U.S. Small Business Administration and the Los Angeles Minority Business Opportunity Committee in recognition of outstanding achievements of minority-owned businesses and their public and private large business supporters.

May joined JPL in 1976 and has managed the Business Opportunities Office since 1981. He has earned both bachelor's and master's degrees from USC, with specialties in business and entrepreneur and venture management. Prior to joining JPL, May served as an inventory management specialist for the U.S. Air Force.

The Business Opportunities Office, a part of the Acquisition Division, serves as the liaison between JPL technical and acquisition representatives and the large, small and minority businesses that want to do business with JPL. This office has met or exceeded all goals for small and minority business participation under the Caltech/JPL prime contract in 2002 and prior years.

JPL and May have received numerous Small Business Administration and NASA awards in recognition of outreach efforts for small and minority businesses.

### Payload takes balloon ride

A JPL balloon payload carrying a suite of instruments for measuring stratospheric chemistry was successfully flown at Ft. Sumner, N.M. on Sunday, Oct. 13.

The 1,100-pound (500-kilogram) payload included JPL's Ozone and Airborne Laser Infrared Absorption Spectrometer II (ALIAS II) instruments and a gas chromatograph from the National Oceanic & Atmospheric Administration's Climate Monitoring & Diagnostics Laboratory. Carried by a 4 million cubic-foot balloon, the payload reached an altitude of 105,000 feet (about 32,000 meters).

The measurements include gases that are sources of chlorine, as well as the resulting inorganic chlorine, so that the total chlorine content of the stratosphere can be assessed. The measurements also will help address questions regarding stratospheric dynamics and mixing between the stratosphere and lower atmosphere.

In addition to the instruments, JPL's ALIAS-II team and Balloon Support Group provided the gondola and instrument flight support. CHRIS WEBSTER (principal investigator), GREG FLESCH and KATY MODARRESS comprise the ALIAS-II team; JIM MARGITAN (principal investigator) and BHASWAR SEN worked on the Ozone instrument; and JESS LANDEROS and RON HOWE comprise the Balloon Support Group. All are from Section 324.

Balloon flights are conducted by the National Scientific Balloon Facility.

### Stardust asteroid flyby Nov. 1

Stardust will take advantage of flying near a small asteroid next month to test many procedures the spacecraft will use 14 months later during its encounter with its primary science target, comet Wild-2.

On Nov. 1, Stardust will pass within about 3,000 kilometers (about 1,900 miles) of asteroid Annefrank. The spacecraft will automatically image Annefrank using camera tracking of the asteroid as it speeds by at 7 kilometers (4 miles) per second.

"We have no science goals or science expectations at Annefrank," said Stardust Project Manager TOM DUXBURY. "It's an opportunity to try key procedures for the first time before we get to comet Wild-2. We may identify problems that we can address before we reach our primary target."

Annefrank is about 4 kilometers (2.5 miles) across. Given the flyby distance, that's too small for a picture that would show any surface detail. Also, the angle of the encounter relative to the Sun will give Stardust a view in which only a

thin crescent of the asteroid will be sunlit during approach, providing an additional challenge for the optical-navigation system to recognize it as a guiding light.

"This will be our most challenging event since launch," said mission manager ROBERT RYAN of JPL. "Our spacecraft team at Lockheed Martin is testing everything in the spacecraft simulation laboratory before we send the commands up to the spacecraft."

Stardust will bring samples of comet dust back to Earth in 2006 to help answer fundamental questions about the origins of the solar system. Additional information is available online at <http://stardust.jpl.nasa.gov>.

### Rosetta shipped to launch site

Twenty instruments on the European Space Agency's comet-chasing Rosetta spacecraft, including three from NASA, are in final tests for launch early next year.

Launch from the Kourou spaceport in French Guiana is scheduled for a 19-day window beginning Jan. 13, 2003. Shipment to Kourou last month from the European Space Research and Technology Centre in Noordwijk, the Netherlands, followed more than 10 months of rigorous testing.

NASA is funding three research instruments and a key part of a fourth for the collaborative mission. NASA also provides one of the Rosetta's interdisciplinary scientists, DR. PAUL WEISSMAN of JPL, and support from JPL's Deep Space Network. "Rosetta is an ambitious mission with great international cooperation," said JPL's DR. CLAUDIA ALEXANDER, project scientist for the U.S. role in the mission. "We're eager to get it launched."

Rosetta will fly for nearly nine years before reaching its destination, comet Wirtanen, in November 2011. Then, as Rosetta orbits Wirtanen at distances as close as one kilometer (0.6 mile), the orbiter's instruments will examine how the comet changes while it moves closer to the Sun during the following 20 months. Rosetta will also drop a lander onto the surface of Wirtanen's icy nucleus. The NASA instruments will examine Wirtanen from the orbiter.

Rosetta carries more instruments than any other spacecraft in history. The orbiter's payload includes a camera, a microscope, spectrometers and an experiment to probe the comet's interior with radio waves.

JPL supplied the Microwave Instrument for Rosetta Orbiter, the first of its type for any interplanetary mission. This instrument can reveal the abundances of selected gases, their temperatures, the speed at which they're coming off the nucleus, and the temperature of the nucleus. Scientists will use it to monitor changes in how vapors are released from the nucleus as the coma and tail grow. JPL's DR. SAMUEL GULKIS is principal investigator.

Information about Rosetta is available at <http://sci.esa.int/rosetta>. For more on the microwave instrument, visit <http://mirowww.jpl.nasa.gov>.

### Blood drive set for November

The next JPL/Red Cross blood drive will be held in von Kármán Auditorium on Tuesday, Nov. 12 from 10 a.m. to 4 p.m. and Wednesday, Nov. 13 from 7 a.m. to 1 p.m.

The Red Cross is currently experiencing a critical shortage of all types of blood, and their inventory continues to remain below desired levels.

Signup sheets are at Occupational Health Services (Building 310-202), and online at [http://eis/medical/blood\\_form.html](http://eis/medical/blood_form.html) prior to the blood drive.

Last-minute signups may go directly to von Kármán at their preferred time. Be prepared to wait a little longer if you do not have an appointment.

To change your appointment, call the Pasadena Red Cross at (626) 397-9776.

For more information about blood donations, log on to <http://www.redcross.org/services/biomed/blood/supply/tse.html>.

# Special Events Calendar

## Ongoing Support Groups

Alcoholics Anonymous—Meetings are available. Call the Employee Assistance Program at ext. 4-3680 for time and location.

Caregivers Support Group—Meets the first Thursday of the month at noon in Building 167-111 (The Wellness Place). For more information, call the Employee Assistance Program at ext. 4-3680.

Codependents Anonymous—Meeting at noon every Wednesday. Call Occupational Health Services at ext. 4-3319.

Gay, Lesbian and Bisexual Group—Meets the first and third Fridays of the month at noon in Building 111-117. Call the Employee Assistance Program at ext. 4-3680 or Randy Herrera at ext. 3-0664.

Working Parents Support Group—Meets the third Thursday of the month at noon in Building 167-111 (The Wellness Place). For more information, call the Employee Assistance Program at ext. 4-3680.

## Friday, October 25

Vienna Choir Boys—The choir will perform a program of costumed operettas, sacred songs, and secular and folk music at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$32, \$28 and \$24. For more information, call (626) 395-4652.

## Saturday, October 26

"A Celebration of Caltech Science"—Emmy-award winning television journalist Charlie Rose will moderate two panel discussions from 9 a.m. to noon in Caltech's Beckman Auditorium. "The Brain" and "The Earth and The Universe" will be the topics of discussion. Admission is free and tickets are not required.

Altadena Old Fashioned Day Parade—JPL Director Dr. Charles Elachi is the grand marshal for the annual event, which celebrates the history of the community of Altadena and includes a day-long festival of family fun activities. Starting at 11 a.m. at Santa Rosa and Mariposa Streets, the parade heads east to Lake Avenue where it turns south and continues to Alameda Street.

## Tuesday, October 29

"Making Data Make Sense: Accessing and Visualizing Very Large Data Sets"—Dr. Daniel Katz, supervisor of JPL's Parallel Applications Technologies Group, will speak from noon to 1 p.m. in conference room 167.

## Wednesday, October 30

Caltech/JPL Flying Club—The fall membership meeting will be held at 7:30 p.m. in the 201 Bridge at Caltech. Guest speaker will be retired Skunkworks and SR-71 test pilot Robert Gilliland.

"Confessions of a 'Dot Com' Refugee"—Rich Fagen, director of information technology software support services at Caltech, will speak at this Caltech Management Association forum at 4:45 p.m. in von Kármán Auditorium.

"Safety-Critical Systems, Natural Language and Requirements"—Dr. John Knight, professor of computer science at the University of Virginia, will speak at noon in conference room 167.

Shout Hallelujah!—A musical variety show featuring song, dance and magic will be presented by the JPL Drama Club at 11:45 a.m. in von Kármán Auditorium.

## Thursday, October 31

JPL Golf Club—Meeting at noon in Building 306-302.

JPL Stories—Dr. Mike Klein, manager of the Deep Space Network Science Office and former program manager for JPL's Search for Extraterrestrial Intelligence (SETI) program, will present "Ghostly Signals From Space: Stories From the SETI days at JPL" from 4 to 5 p.m. in the Library, Building 111-104. For more information, call Teresa Bailey at ext. 4-9233.

## Friday, November 1

Caltech Women's Club—A welcoming coffee will be held at Avery Library from 9 to 10:30 a.m. Contact Carol Andersen for more information at (818) 790-8175.

## Sat., Nov. 2–Sun., Nov. 3

Vandenberg Air Force Base Air & Space Show—Gates open at 8 a.m. for the event, which features aircraft fly-bys, demonstrations and performers, as well as exhibits of JPL missions launched from the base and other



NASA projects. Admission is free. For more information, visit <http://www.vandenberg.af.mil>.

## Sunday, November 3

Chamber Music—The Berlin Philharmonic Wind Quartet will appear at 3:30 p.m. in Caltech's Beckman Auditorium. Tickets are \$29, \$25, \$21 and \$17. For more information, call (626) 395-4652.

## Tuesday, November 5

JPL Gamers Club—Meeting at noon in Building 301-227.

JPL Genealogy Club—Meeting at noon in Building 301-271.

## Wednesday, November 6

Associated Retirees of JPL/Caltech—Meeting at 10 a.m. at the Caltech Credit Union, 528 Foothill Blvd., La Cañada.

## Thursday, November 7

Irish Poetry—Renowned poet Seamus Deane will appear at 8 p.m. in Caltech's Beckman Institute Auditorium. His topic will be "Politics and Culture in Modern and Contemporary Ireland." Admission is free. For more information, call (626) 395-4652.

JPL Gun Club—Meeting at noon in Building 183-328.

## Friday, November 8

"What's the Color of Funny? Race, Society and Comic Strips"—Aaron McGruder, creator of the *Boondocks* comic strip, will speak at 8 p.m. in Caltech's Beckman Auditorium. Admission is free. For more information, call (626) 395-4652.

## Fri., Nov. 8–Sun., Nov. 10

Double Infidelity—The play by Mari-vaux will be performed by Theater Arts at Caltech Friday and Saturday at 8 p.m., Sunday at 2 p.m. Tickets are \$15. For more information, call (626) 395-4652.



Balloon carrying JPL payload is inflated at Ft. Sumner, N.M.



# New Directions in SCIENCE

BY MARK WHALEN

*Following a three-month transition period that ended in August 2001, JPL Chief Scientist Dr. Thomas Prince has been on the job for a little over a year now. Universe caught up with him to discuss how things are going, his goals and areas of emphasis.*

## W

**hat attracted you to the job?**

When Charles Elachi became JPL director in May of last year, he approached me and asked me to consider taking the position. The job appealed to me because it offered the opportunity to be very proactive in developing new directions and new research at JPL.

**Any particular highlights stand out during the first year?**

Yes. The major new item that has come online is the establishment of the Research and Technology Development Program. This has resulted in a significant increase in the funding available for investment in the future of research and technology. NASA worked with us on defining the program, which will allow us to progress from \$2 million in JPL research funding in fiscal year 2002 to \$10 million in 2003.

The success in this area is due very much to Charles' initiative, and there's been a great response to the program. For FY '03, we've received a large number of proposals, far exceeding the \$10 million available—about \$64 million worth of requests.

last year, so this is the first time that a science and technology group has had such high management visibility. It's been very enjoyable to watch the Council come together as a group and begin to help develop the strategy for science and technology at JPL.

**What are the chief scientist's roles and responsibilities?**

**What are your goals?**

I view my job as helping JPL to achieve its objective, which is excellence in space exploration. I'm interested in the new directions, programs, technologies, and new science that we can initiate. I'll be working with Erik Antonsson, the new chief technologist, to identify key areas and increase our research investment in these areas.

**There's an interesting story associated with your coming to JPL.**

**Tell us how it all came about.**

Well, I came to Caltech from the University of Chicago in 1979 as a post-doc, to start collaborative work with a gamma-ray astronomy group at JPL. I came from a lab at the University of Chicago that had three professors, each of whom eventually sent one of their graduate students to become a professor at Caltech. One was Robbie Vogt (a previous JPL chief scientist); one was Ed Stone, the retired JPL director; and the third was myself. All three of us started at the same lab at the University of Chicago; we all ended up at the same Space Radiation Laboratory at Caltech. Eventually, we all took on roles in the JPL management.

Since coming to Pasadena, I have worked with JPL on a number of joint activities. While on campus I worked collaboratively with the Lab on supercomputing, and also worked jointly with JPL on Medium-class Explorers (MIDEX) proposals. More recently, I shifted research directions and became interested in gravitational waves. Immediately before becoming chief scientist here, I took a position at JPL as the U.S. mission scientist on the Laser Interferometer Space Antenna (LISA) Project. With LISA, we're building an instrument that has the prospects of looking back to the first fraction of a second of the beginning of the universe.

**What do you enjoy most about your job? What has been the most exciting thus far?**

One of the very enjoyable parts of my work is just sitting down with the scientists and technologists here and learning what they do.

Another part is helping to identify new and innovative ideas, and helping the people who have those ideas make them into reality. And the more innovative the ideas are, the more exciting it is to be in on the ground floor. I really enjoy helping other people achieve their individual aspirations.

More broadly, the work that's done here at the Laboratory in the planetary, Earth science, and astrophysics areas is all just very exciting. Recently, I spent a very enjoyable half-hour over at the Spacecraft Assembly Facility and just watched them integrating the Mars Exploration Rovers. To just see a project like that coming together so quickly is amazing.

**If a science student asked you what he or she could gain or contribute working at the Lab in the future, how would you answer?**

JPL is unique, in the sense that it combines the flavor and tradition of Caltech research with the ability to do exceedingly hard and technically challenging large space projects. Very simply, we undertake space exploration in a way that no other organization can. That's why students come here. For students interested in really being part of the cutting edge of space exploration, there's no better place than JPL.



"The more innovative the ideas are, the more exciting it is to be in on the ground floor. I really enjoy helping other people achieve their individual aspirations."

Another new direction we're going

is to initiate new collaborative efforts with universities and other outside research organizations. We will be investing more in these collaborations using the Director's Research and Development Fund program, especially at the early stages. Being the best includes collaborating with the best and we need to keep on the cutting edge by forming strong research partnerships with top-notch research efforts outside of JPL.

Another key development over the last year is the establishment of our Science and Technology Management Council, where a chief scientist and chief technologist represent each Lab directorate. Among other activities, the Council oversees the Research and Technology Development Program funding and the Lab's Centers of Excellence Program.

The Science and Technology Management Council did not exist before



# The Universe is moving

As of Oct. 28, the Universe

office will be relocated to

Building 111-B29C,

directly across the street

from the JPL Store.

The phone number for Universe

remains the same:

ext. 4-6089.

View this and previous issues of Universe online

<http://universe.jpl.nasa.gov>

## Editor

Mark Whalen

## Design & Layout

Adriane Jach, Audrey Steffan/  
Design Services

## Chief Photographer

Bob Brown/Photo Lab

## Advertising

Susan Braunheim-Kalogerakos

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## Notice to Advertisers

Advertising is available for JPL and Caltech employees, contractors and retirees and their families. No more than two ads of up to 60 words each will be published for each advertiser. Items may be combined within one submission. Ads must be submitted on ad cards, available at the JPL Store and the Universe office, Bldg. 111-B29C, or via e-mail to [universe@jpl.nasa.gov](mailto:universe@jpl.nasa.gov).

Ads are due at 2 p.m. on the Monday after publication for the following issue.

All housing and vehicle advertisements require that the qualifying person(s) placing the ad be listed as an owner on the ownership documents.

# Food drive on; United Way kickoff Oct. 31

A kickoff celebration for this year's JPL United Way Campaign, "Bridging the Gap, Making a Difference," will be held on Thursday, Oct. 31, at noon on the mall, in conjunction with a Halloween fashion show. A \$5.50 barbeque lunch special will be offered at the Armadillo Grill, of which 50 cents per meal will be donated to United Way by Caltech Dining Services.

Those participating in the costume fashion show will receive a coupon for 10 percent off one item at the JPL Store. All winners will be entered in a drawing to win two tickets to Disneyland (donated by the JPL Store).

Last year, United Way of Greater L.A. raised \$65 million, including \$450,000 from JPL's campaign. Beginning Oct. 31, campaign representatives in each JPL organization will begin contacting employees about participation. The campaign will run through Nov. 22. For more information, see JPL's United Way website at <http://hr/unitedway>, or call Nancy

## Letters

I would like thank all my wonderful friends, colleagues, Section 381 and JPL for the kind words, support and prayers after the passing of my grandfather early this year and during the recent passing of my grandmother. My family and I were very touched by the beautiful cards and flowers.

Rosanna Sumagaysay-Aouda

My family and I wish to thank my friends and co-workers in the SIRTf Project Office, Acquisition Division and ERC for your support and help in my hour of deepest sadness for the recent passing of my son. Though I know more should be said, further words of gratitude escape me at this time.

Kirk Bilby and family

We would like to thank our co-workers and the ERC for the thoughtful card and plant that we received on the death of Doug's father. The donations to the Alzheimer's fund were greatly appreciated. Thank you all for the kindness shown.

Doug and Bonnie Shepard

## Passings

**LAWRENCE KOSS** of Section 280 died Sept. 7. He worked at JPL for 16 years, and is survived by wife Lexuan and sons John and Daniel.

**CHARLES CRAWFORD**, retired from Section 673, died Sept. 14. Crawford worked at the Lab for 19 years. He is survived by his wife, Amelia, and two daughters.

**JACK WHITEHEAD**, retired from Section 351, died Sept. 14. He is survived by his daughters, Laura and Sherry.

**MARSHALL TROUT**, retired from Section 662, died Sept. 16. He is survived by his wife, Lyllus.

**GEORGE BARBANI**, retired from JPL after 38 years of service, died Sept. 18. He is survived by his wife, Norma, daughter Linda, son Mark, and four grandchildren.

## Retirees

The following JPL employees retired in October: Charles Bryant, 40 years, Section 333; Robert Hall, 40 years, Section 352; Paul Batelaan, 37 years, Section 386; Minnie Perry, 34 years, Section 344; Clara Thoms, 29 years, Section 273; Alan Harris, 28 years, Section 323; Vincent Escobedo, 23 years, Section 662; Robert Emmons, 22 years, Section 215; John Repar, 21 years, Section 352; Suzanne Craig, 18 years, Section 381.

## Classifieds

### For Sale

AUTOHARP, 15-chord Chromaharp, exc. cond.. \$225. 323/255-5220, Toni.  
BEACH CRUISER, red, gd cond., \$30. 6/850-4378.  
BIKES, boys, Huffy, \$45; girls, \$15, both vg cond.; CHAIN SAW, gas, \$50; COLLECTOR PLATES, 20-25, porcelain, \$30. 626/359-7666.  
BIKE RACK, Hollywood for mini-van, 4 bikes, exc. cond. \$40; IN-LINE SKATES, Variflex, men's sz. 7, women's sz. 9, never used, \$35. 626/574/9664.  
BIKE RACK, new, \$15. 626/254-0886, after 6.

BLOCK YARD SALE, 2100 Oakdale St., Pas., betw. Del Mar/San Pasqual & Allen/Craig, near Caltech, Sat., Nov. 2, 9 a.m.-3 p.m., furn., dishes, toys, linens, tools, misc. 626/795-5235.

BOOKS, complete works (or nearly) of Louis L'Amour, 115 hard bound, great for frequent flyer, \$300 or about \$2.50 per. 626/355-0123.  
CALCULATOR, Texas Instruments TI-59 programmable w/PC-100C print cradle (incl. roll of paper), Master Library Solid State Software mod-ule (no battery pack, no documentation), has magnetic card reader but no cards, incl. TI Math-ematics Specialty Packet booklet, calculator/print cradle verified to work, \$50. [tcfs@aprelix.com](mailto:tcfs@aprelix.com).  
CEMETERY PLOTS, 5, at Rosehills, Garden of Autumn on developed land, willing to sell each plot separately if necessary, valued at \$2,100/ea., sell for \$1,800. 909/986-4611, eves.  
CHRISTMAS TREE, evergreen, long needles, good cond., 7 ft. high, full, stand, lasts forever, \$40. 626/445-6677, after 6 p.m.  
CLIMBER, Little Tykes SwingAlong, for ages 1-3 yrs, swing and slide, like-new cond., pur-chased for \$120, sell for \$90. 626/850-4378.  
COFFEE MAKERS, Krups 10-cups, white/gray, like new, \$40/obo; Braun 10-cups, white/black, like new, \$30/obo. 626/791-6101.  
COMPUTER, laptop, 20 GB hard drive, Fujitsu MHM2200AT 9.5mm (slim), \$120. [altatension@hotmail.com](mailto:altatension@hotmail.com).  
COMPUTER, Compaq, with monitor, Pentium P-400, 128M RAM, CD-ROM, new 56K Intel modem, \$395. 951-0000, Nik.  
COMPUTER DESK, ample storage and place for printer/CPU. 243-8255.  
COUNTRY CLUB MEMBERSHIP, Silverlakes, Calif., resort, golfer's dream, 4 wks free golf each year at priv. PGA-rated course with driving range/putting greens, 2-bd. condo for up to 6, 2 lakes, many amenities, less than 2 hrs. from Pasadena, exch. rights w/3,000 resorts, reduced to sell due to illness, \$15,000. 805/967-7725.  
DINING SET, table, rectangular, white-washed oak, burl-top, Bernhardt with six chairs, 2 with arm rests, 2 unused leaves to expand table to sit 8 people, exc. cond., cost \$1,800 new, sell for \$800/firm. 626/577-2882.  
DINING TABLE, beautiful, lg. w/matching china set, also incl. 2 lg. sofas + coffee table, all furn. is beige, only 1 yr. old, hardly used. 353-9859.  
DINING TABLE, mahogany stained Ponderosa Maple, 2 Duncan-Phyfe pedestals w/brass claw feet, rnd corner top w/custom glass top, from 1940s, 40" x 60", photo at JPL Store, \$450/obo. 626/296-3782  
DOG HOUSE, wooden, for medium dog, great cond., \$40. 952-8032.  
ENTERTAINMENT CENTER, cabinet, gd. cond., 2' x 2' x 5' high, blond wood w/smokey glass, 4 shelves w/bottom drawer for CDs/DVDs, \$100. 626/445-6677, after 6 p.m.  
EXERCISE APPARATUS, Weider, multi-station, exc. cond., \$150. 626/355-0123.  
FIELD TRIPOD, heavy-duty, model Paragon HD-F2 from Orion, tri-braced alum.\-tube legs, quick-release 1/4"-20 dovetail shoe, convertible cushion/spike ft, built-in bubble level, incl. polyester/nylon case, only used once, \$90/obo. 323/268-6645.  
FISH TANK, 50 gal., w/new stand, incl. all pumps, filter systems, etc., \$175. 626/405-9701.  
FURNITURE: bdrm suite, Victorian style in oak by Lexington, qn. bed w/footboard and 6' head-board; dresser, 9 drawer w/spindle mirror; lingerie chest w/mirror; 2 washstands; sm. writing desk, all in gd cond., set is 10 yrs. old and still mfd. today, picture avail. via e-mail, orig. pd. over \$4,000, sell \$2,000. 909/948-0049.  
FURNITURE: desk, Spanish oak, + 2 matching bookcases, \$700; mission sideboard w/mirror, \$1,200; mission library desk, \$400; office furn., Techline, in white, 6 pieces, \$500; hall table, drop leaf, \$250; butcher block utility table, unfinished, \$200; sev. mirrors; 2 Ikea golden oak bookcases, unopened, \$100; rug, Spanish, hand-made, bright colors, \$250; NordicTrack, original, \$50. 626/584-0860, Donna.  
FUTON PAD, full-size, good cond. \$25; BIKES, 2, 10-speed, 19" & 21", good cond., \$15/ea; MITER SAW, \$5. 626/574-9664.  
LEATHER JACKET, ladies, size 2, black, lined, w/ belt, new, \$100; OVERCOAT, men's London Fog, w/thermal liner, sz. med, hardly worn, beige, \$75. 760-3326 or [bogusboo@hotmail.com](mailto:bogusboo@hotmail.com).  
MAGAZINES, Sky & Telescope, 1960-92, 1 missing issue, \$350; Smithsonian Astrophysical Observatory Star Catalog & Atlas, 4 volumes, \$100. 952-0408.  
MISC: living rm set, 3-pc., leather; steamer trunk w/glass tabletop; cordless phone; cell phone; torchiere lamp; Earthlink home network-ing router. 626/818-3460.  
MISC: recliner, teal, \$49; peacock chair, wicker, \$29; Shiatsu massager, fits in chair, \$39; spare tire, donut, T105 80D-13, \$49; baby crib, maple, \$29; stroller, \$19; microwave cart, solid oak, \$39; side table, oak, \$19; wedding gowns, size 5/6, \$159, size 3/4, \$99; mini blinds, 72" w x 50", 2 for \$29; doorbell/intercom, wireless, \$39; quilting frame, \$29; Imation external SuperDisk drive for Mac, \$49. 626/798-4510.  
PC/SERVER BATTERY BACK-UP, brand new, American Power conversion ES series, model no. BE350U, \$28. 956-3745, Steve.

Kapell, ext. 4-9432, or Laurie Lincoln, 4-1612.

The annual United Way food drive is underway and continues through Nov. 22. Last year, JPL staff donated enough food to help feed more than 1,500 families. Participating agencies are Duarte Community Service Council, El Monte/South El Monte Emergency Resources, Foothill Family Services, Pacific Clinics, and Glendale Community Center of Catholic Charities. Suggested items for food donations include canned items such as meats, fruits, vegetables, soup and stew, and dried foods such as cereal, coffee, flour and sugar. Food donations can be placed into barrels at the following locations: Building 114-104, JPL Store; 177, dispatch office; 180, 1st floor lobby; 180, 2nd floor entrance; 183, 3rd floor elevator; 190 cafeteria; 198-105; 230, guard desk; 238, lobby; 241-208, travel reservations; 281, credit union; 301, 2nd floor; 303, lobby; 306, lobby; 601, guard station.

Food or cash donations will be accepted at the kickoff celebration.

POOL TABLE, 8 ft., incl. light bar, cue stick rack, waterproof cover, all playing accessories, 10 mo. old, rarely used, like new, \$995. 626/405-9701.

REFRIG./FREEZER, Kenmore, 25.8 cu. ft., side-by-side, 18 yrs. old, grt. cond., \$325. 259-5526.  
SAMPLE SALE, Oshkosh B'Gosh kids' clothing, salesmen's samples, less than wholesale, Sat., Oct. 26, 8 a.m.-2 p.m., 3525 McNally Ave, Altadena, N. of Loma Alta, 1 block E. of Fair Oaks.  
SOFA, makes to qn. bed, abstract black, blue & mauve design, gd cond., \$300; BICYCLES, 4, children's, fair cond., \$10/ea.; LADDER, aluminum, \$50. 626/357-8210.  
TELESCOPE EQUIPMENT: Meade 12" LX 200 with computer drive system (Smart Drive), Apogee AP47P digital imaging system, comprising a TE cooled camera head with Grade 1 Marconi 47-10 CCD and Maxdim DL/CCD image acquisition and processing software, Meade Super Wedge and Dew Shield, plus other additional accessories, virtually unused, paid \$13,000 sell \$9,750. 805/492-0576, [ts44@gte.net](mailto:ts44@gte.net), Tony.  
TREES, fish tail, 6' tall, \$80/obo; ficus, braided, in 30" plastic pot >10" tall, \$250/obo; CERAMIC BOWL, gray, 2' diameter with planted geraniums, \$40/obo. 626/791-6101.  
WASHER and DRYER, \$80/ea. 626/584-1164.  
YARD SALE, 4 family, Nov. 2-3, 8 a.m. to ?, clothes, toys, books, misc., lots of great items, 3350 N. Bartlett Ave., Rosemead, off 10 fwy.

### Vehicles / Accessories

'79 CADILLAC DeVille, drives well, good tires, passed 2002 smog test, cruise, tilt wheel, \$700. 626/254-0886, after 6 p.m.

'93 CHRYSLER Town & Country, white, 7-pass, auto, new shocks & ABS, roof rack, chains, great family car, 116K mi., \$4,900/ obo. 549-1594, Pascal.

'00 FORD Mustang GT conv., silver w/black top, loaded, leather, 36,000 mi., exc. cond., \$18,000/ make offer. 805/660-4226.

'99 FORD Taurus, beautiful cond., loaded, low mi. 72,000, \$5,995. 626/379-3503, Erik.

'99 FORD Taurus wagon, metallic silver, great spacious family car, 12-valve V6 3.0L eng., 79K mi., exc. cond., \$8,300/obo. 626/584-1164.  
'98 FORD Windstar, 6 cyl., 3.8L, gold/lt. brown int., low 46K miles, power windows/locks, alarm, am/fm/cass. stereo, 10-disk CD changer, exc. and clean cond., \$9,400/ obo. 661/254-3147.

'68 FORD Mustang Classic Calif. Special, GT/CS, hi-per 302 cid, 75K orig. mi., auto, fac. a/c, PS, AM radio, metallic gold paint, black interior, GT hood, trunk, fogs and wheels, no rust, manuals, turns heads. \$13,250/obo. 626/963-5727.  
'91 HARLEY-DAVIDSON Sportster 883, 19K mi., black, oil cooler, belt drive, good condition, \$4,600/obo. 661/254-8012.

'98 HONDA Shadow ACE deluxe motorcycle, 750 cc, green/cream, great cond., extr. well maint., some extras, 51K mi., \$4,250/obo. 293-0599.

'97 HONDA Accord EX, p/s, p/b, moon roof, CD, alarm system, loaded, new brakes, 112K mi., runs great, \$9,500/obo. 661/718-8483.

'97 HONDA Valkyrie motorcycle, exc. cond., very clean, many extras, chrome parts, garage kept, 23,000 mi., leather bags. 957-2852.

'85 HONDA Accord sedan, good cond., well maintained, 4 door, automatic, white w/blue interior, 167K mi., \$1,850. 626/914-7853.

'96 JEEP Grand Cherokee Laredo, 65K mi w/ext. warranty to 75K, 2WD, V6, single owner, \$9,000/obo. 626/862-3477.

'85 KOUNTRY Lite 5th wheel trailer, 30 ft., orig. owner, alum. frame, 13.5K a/c, side bath, microwave, TV/VCP avail, new tires & water pump, sleeps 6, exc. cond., renewed lic.-Mar. \$7,200/obo. 626/963-5727

'95 MERCEDES-BENZ S420, exc. cond., 59K miles, black/tan, loaded, solid/smooth ride, \$28,000/obo. 249-9747.

'95 PONTIAC Bonneville, exc. cond., V6, fully powered, a/c, pdl., pw etc., forest green, tan interior, 98,000 mi., all service records, great car for \$5,200/obo. 790-0875.

'96 SAAB 900S, dk. green w/beige interior, 87M, orig. owner, exc. cond., all maint. records, 5 speed, a/c, factory stereo, alloy wheels, \$7,900/obo. 310/306-7319, Mike.

'98 SATURN SL2, 68K mi., silver, a/c, am/fm/cass., vg cond., \$6,300. 626/355-5631, Tim, after 5:30 p.m.

'01 TOYOTA Corolla, exc. cond., only 22K mi., 5 spd, silver, alloy wheels, CD, a/c, pwr. everything, all dealer service, great, reliable, fun to drive, \$12,450. 626/396-1945, lv msg.

'99 TOYOTA Camry, 30,000 actual mi., exc. cond., \$13,000. 248-6762.

'01 VOLKSWAGEN Beetle GLS, silver/black leatherette, 5 spd, pwr. locks/windows/mirrors, cruise, alloys, AM/FM cass, CD changer, fog lights, ABS, remote keyless entry, 11.5K mi., \$16K. 626/449-0997.

'96 VOLVO 960 wagon, top of the line, exc. cond., all auto, a/c, leather int., heated leather seats, 6 disc CD/cass., all power, moon roof, 3rd seat, no accidents, white/gray, 97,000 mi., \$12,000. 626/296-3441.

### Free

CAT, cute, cuddly, 8 year-old male Tabby, fixed, friendly, never bitten or scratched anyone, terribly healthy, loves playing w/people & dogs, but doesn't get along w/cats, loves outside but sleeps on your toes at night. 626/395-1908, Charlie.

CATS, 2, beautiful, adult male Siamese, lt. brown, 7 yrs, front claws removed; adult female, brown, tortoise shell, 5 yrs., both have shots and are spayed/neutered. 769-8468, after 8 p.m.

CAT, gray Tabby kitten, med.-length hair, litter trained, healthy, very playful, friendly; mother cat also needs a home, 1 yr old. 626/287-9433.

RUBBLE ROCK, about a pickup truck bed worth, unearthed from Foothill area, various sizes and colors but mostly gray/black. 957-7623 or [erik@hovland.org](mailto:erik@hovland.org).

### Wanted

HOUSING, JPL employee, older single man, no pets, no smoke, needs small apt. or cottage near JPL for weekdays only. 393-7368.

SHARP ZAURUS ZR5000, must be in working order. 323/662-4089.

SPACE INFORMATION/memorabilia from U.S. & other countries, past & present. 790-8523, Marc Rayman.

TOY WAGON & WOODEN BLOCKS, used, to buy, in gd cond., for 1-2 yr. old. 626/351-8643.

### For Rent

ALTADENA, room, kitchen priv., share ba., washer/dryer, pool, \$400. 626/345-0692.

GLENDALE, furn. room, share cable, utilities, and complete house privileges, cent. courtyard w/fountain, deck w/gazebo, ba. with garden view, no smoking or drinking, \$650. 246-4750.

MONTROSE, lg. 1-bd. apt., 10 minutes from JPL, \$695. 626/445-0884, John.

PASADENA, spacious 2-story condo, 3 bd., 2.5 ba., prestigious community, beaut. inter., bright kitch., prof. landscape, ctrl. air & heat, close to shop., cozy 1/2 w/FP, end unit, frml. d/r, hdwd. flrs., immac. cond., close to schls, \$1,750. 626/396-9024.

PASADENA, 3 bd., 1 ba., garage, stove and fridge provided, no smoking, no pets, 1754 Corson St., drive by, pick up brochure, then call for appointment, \$1,490. 626/798-4510.

TEMPLE CITY, back house, 2 bd., 10 mins from JPL, no pets, one person, stove, fridge, micro incl., very clean, \$1,000. 626/795-3608.

### Real Estate

INCLINE VILLAGE, Lake Tahoe view from a beautiful 2 story, 2 bd., 2 ba., sleeps 6, time-share, unit 36, week 37, great time of year for annual Reno Air Races, \$3,000. 562/404-3464 x230 or 909/986-4611, after 6 p.m., Janelle.

### Vacation Rentals

BIG BEAR LAKEFRONT, luxury town home, 2 decks, tennis, pool/spa, beautiful master bd. suite, sleeps 6. 949/786-6548.

CAMBRIA, ocean front house, sleeps up to 4, exc. view. 248-8853.

COSTA RICA, Pueblo Real, Quepos, 2 bd., 2 ba., condo, fully equipped kitchen, TV, VCR, sleeps 6, air, newly remodeled, large pool, tennis, typical restaurant, nr Manuel Antonio, next to river w/ mangroves and monkeys, close to beach, JPL rates, [luisalfaro@earthlink.net](mailto:luisalfaro@earthlink.net) or 760/723-8522.

HAWAII, Kona, ocean front on Keauhou Bay, house/guest house comfortably sleep 6, 3 bd., 2 ba.; rustic, relaxing, beautiful; swimming, snorkeling, fishing, spectac. vw, near restaur-ants, golf and other attractions. 626/584-9632.

HAWAII, Maui condo, NW coast, ocean front view, 25 ft. fr. surf, 1 bd, w/loft, compl. furn. phone, color TV, VCR, microwave, d/w, pool, priv. lanai, slps 4, laundry fac., 4/15-12/14 \$105/nite/2, 12/15-4/14 \$120/nite/2, \$15/nite/ add'l person. 949/348-8047, [jackandrandy@cox.net](mailto:jackandrandy@cox.net).

LAKE TAHOE condo, N. Shore, 2 bd., 2.5 ba., sleeps 6, all amenities, convenient location, walk to shuttle to local ski areas, 2 miles to casinos, avail. by the week only during holidays, 4-day min. rental all other times, special JPL discount. 626/355-3886, Rosemary and Ed.

MAMMOTH, Snowcreek, 2 bd., 2 ba., + loft, slps 6-8, fully equip'd kitch. incl. microwave, D/W, cable TV, VCR, phone, balcony mtn. vw., Jacuzzi, sauna, streams, fishponds, close to Mammoth Creek, JPL disc. 626/798-9222 or 626/794-0455.

OCEANSIDE condo, fully furn., 2 bd., 2 ba., fireplace, full kitchen, quiet, relaxing, beautiful beachside setting; BBQ, pool, spa, game room, great ocean view; easy walk to pier/restaur-ants, slps 8, avail. weekly or monthly, 909/ 981-7492 or [dhauge@yahoo.com](mailto:dhauge@yahoo.com), Darlene.

OCEANSIDE, on the sand, charming 1 bd. condo, panoramic view, walk to pier & harbor, pool/spa, game rm., sleeps 4. 949/786-6548.

PARK CITY, Utah, 12/17-12/24, 1 bd., sleeps 4, fully furn., w/kitchen, indoor pool/spa, 3 world-class ski resorts, shopping, restaurants, night life, 40 mi. from SLC airport, \$600. 897-1203.

ROSARITO BEACH condo, 2 bd., 2 ba., ocean view, pool, tennis, short walk to beach on priv. rd., 18-hole golf course 6 mi. away, priv. secure parking. 626/794-3906.